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Direct Detection of the Atmospheric Production rate of ^{14}C

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Radicoarbon has been used for decades in examining a wide range of questions within the geosciences. A portion of this work is directly dependent on the ^{14}C production rate, yet little has been done to measure the actual production rate in the atmosphere and compare with theoretical estimates.

We have successfully measured the ^{14}CO production rate in compressed air from samples that have been exposed to atmospheric radiation. ^{14}CO is the primary stable product of ^{14}C (greater than 90% yield), and is therefore indicative of the ^{14}C production rate. Exposure cylinders, which contained ultrapure air doped with ^{14}C-free CO, were placed at the Southo Pole, on Mount Cook, New Zealand, and at Scott Base, Antarctica, for about one year. Exposure cylinders were also placed at 50 meter intervals along the 300-meter-high BAO (Boulder Atmospheric Observatory) tower in Erie, Colorado. The tower was used to help quantify the ground effect of ^{14}C production. Subsequent to exposure, the cylinders were processed in the lab, where the CO was extracted and removed (using previously established methods) for graphitization and accelerator analysis.

We present these intial resiults along with a comparison of our data with model simulations of ^{14}C production rates.

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